The MAC Flyer

JANUARY 1976

1776-1976
Ushering in our Bicentennial

The MAC Flyer

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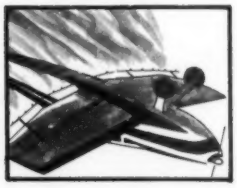

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Flyer Call

Our November cover prompted complaints from some of our readers. You may recall that it featured a DD Form 365F, Weight and Balance Clearance Form, with a photograph of a C-141 superimposed upon it.

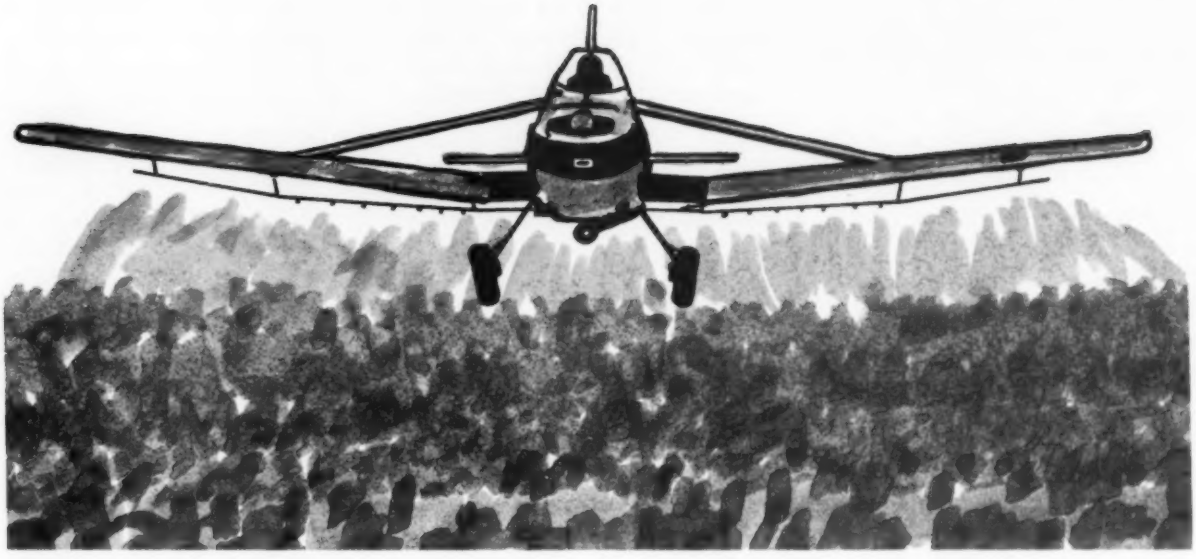
The complaints concerned the name we used in the "computed by" block of the form. Some readers felt that the name, "Italiano Lies," was a slam on persons of Italian descent. It was not meant to be. It was intended as a pun. The spelling of the name was meant to equate to "I-tell-you-no-lies." The editors hoped this would inject a little humor and simultaneously emphasize the importance of accurate weight and balance computations. Unfortunately, some of our readers didn't think it was very humorous. Our apologies to anyone who felt offended by it.

On another subject, the staff would like to thank everyone who contributed articles during 1975. The efforts and expertise of MAC writers from detachment level to MAC headquarters were instrumental in assuring a top-quality magazine throughout 1975.

The editors are always looking for new ideas. So, keep the articles, letters, and ideas coming in '76. We want to produce an even better magazine this year.

Honorable Mention
1975 MAC Flying Safety Writing Contest

The Downed Crop Duster with a 2,000-Pound Bomb



by Capt Derek L. Duke
301 ARRS (AFRES)
Homestead AFB, Fla.

The waitress in Maxie's Restaurant came over with her usual good morning smile.

"What'll it be, Lucky Larry?" she asked. "Not just coffee, I hope."

Larry grinned, "Yeah, Ruthie, you know me. Just coffee."

"Larry, you'd better start eating. How much weight have you lost anyway?" she asked. "You're getting skinny."

"Only about 40 pounds, but I can stand it," he replied, shoving a handful of graying hair back into place. "By watching my diet, I've managed to lose six pounds in the last two days."

Ruth took a closer look at him. Yes, he probably had lost six pounds and in doing so had become thin faced. This morning he looked plain tired.

"Why don't you have some ham

Downed Crop Duster

and eggs?" she urged. "If you're flying again today, you'll need it."

"Hey, what's all this?" Larry said, feigning seriousness. Then he chuckled softly, sending Ruth on her way.

"Okay, okay. I'll get the coffee," she sighed.

Danny walked into the restaurant just as Ruth was pouring Larry's coffee. He walked back to the booth, sat down across from his old friend, and ordered ham and scrambled eggs. He turned to Larry.

"And how does the old, bold pilot feel this morning?" he teased.

"Well, if it isn't the Reserve's boy pilot, out for the weekend war," Larry drawled.

Danny laughed. "What time we gonna meet at the lake? You aren't gonna be too tired to fish, are you?"

"Whatta ya mean, Flyboy?" Larry shot back. "I'll have a boatload of fish before you even get there."

"Only if you dusters fly safe. I'll have enough to do today without having to buzz over and rescue you."

"That's what the taxpayers pay you for, my boy — just to fly around Saturdays and pass out Band-Aids." Now Larry laughed.

"Okay, dirt bomber, where you gonna be spraying today so I'll know where to find you when you need help?"

"Man," Larry howled, "I don't want you anywhere around me in that flying buzz saw of yours... especially if I need help. Just stay at home and take care of those wild blue yonder boys. They need it."

Danny was about to respond, but Larry cut him off with a wave of his hand and stood up. "See you about five o'clock." He winked and walked quickly out of the restaurant.

After leaving Maxie's, Larry drove straight to the general aviation airport where his crop duster was hangared. He was anxious to get under way. A day's work lay ahead and he wanted to make the lake by five.

Three hours later Larry pushed the throttle forward for takeoff. The engine responded smoothly and the pilot breathed in the exhilarating morning air. It was a beautiful day to fly.

Larry looked down from 1,000 feet and saw the "flag boy" pickup truck parked at the edge of the field, just north of the television tower. This was the one. Just a wide open tomato patch, he thought. He checked the wind, surveyed his run-in and pull-up paths, and rolled the aircraft in for his first run of the day.

Larry activated the sprayer as he winged by the "flag boy." Maintaining a good track, he laid down a perfect pattern to the access road he was using as a cut point. As he approached the road he pulled back smoothly on the controls and began that classic high G, up-and-down-and-back-the-other-way maneuver that is so characteristic of crop dusters. He loved to perform this tough maneuver.

Off the edge of the big field, under the shade of a tree, Mr. Martin sat comfortably in his pickup. He puffed on a big cigar and watched the fog of fertilizer spray trail from the low-flying plane.

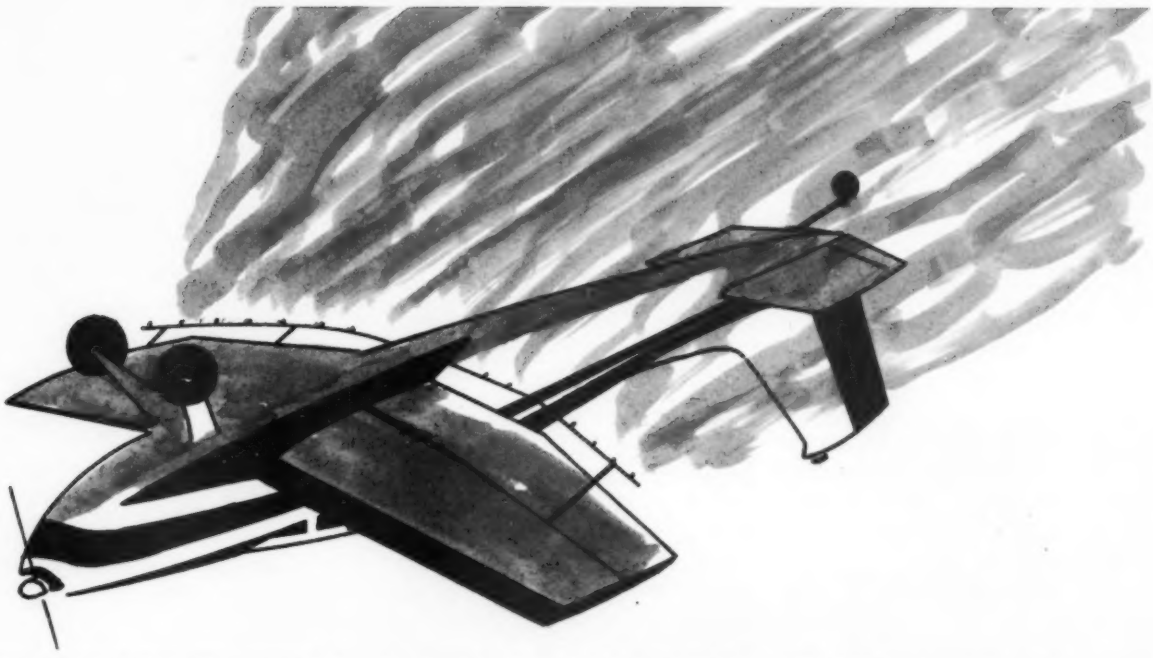
Fertilizing by aircraft is expensive, he thought, but the only economical method for a large farm. Besides, Lucky Larry's the best duster there is and I enjoy the hell out of watching him fly.

Martin chomped on his cigar and smiled as Larry's plane rose to a vertical nose-up attitude on its pull-up. The aircraft shot upward, past the normal descent point. Martin stretched himself forward and looked out of the top of his windshield. Something was wrong. The plane was going straight up, something he had never seen before.

"My God," Martin rasped in disbelief, "what's he doing?"

The aircraft, now several hundred feet in the air with its nose still straight up, stopped in midair. With the engine popping wildly, the left wing suddenly dropped and the nose whipped downward.

The aircraft was going almost straight down when it slammed into the tomato field near the access road. Martin sat like a zombie, his cigar dangling be-



tween opened lips. The sound of scraping metal caused nausea to swell upward from his stomach. A small explosion scattered some of the wreckage, but the fuselage was still intact. Martin recovered enough to grab the phone from its cradle on the dash.

"Police," he managed to gasp as the operator answered.

* * *

The Reserve H-3 was on final for its last landing of the morning local. Major Bob Evans was flying and the landing spot was the Reserve ramp helipad.

"Jolly 97, Patton Tower," crackled the radio.

Bob glanced at Danny. The young captain answered. "This is Jolly 97. Go ahead."

"Jolly 97, we've just received a call from an off-duty airman. He heard a broadcast over police band that a light aircraft had crashed east of the field over by the Channel 13 tower. Would you take a look?"

Bob pulled in power.

"Jolly 97's on the way," Danny called.

The major leveled the H-3 at 500 feet above the ground and let the airspeed build to max.

"Ben," he called over interphone to the flight mechanic, "you'd better get the asbestos gloves and fire bottles ready. You're gonna have to be our rescue team."

Danny nodded out the cockpit window toward the television tower, just visible in the distance. He saw a thin wisp of white smoke just off to the north.

"That might be it," he said. "Let's keep our eyes open, though. I was sort of expecting black smoke."

As they neared the TV tower, the pilots could see the field from where the white smoke was rising. Because of the smoke, they could not see an aircraft, but a crowd of people had gathered nearby and police cars raced down an access road toward them. It had to be the crash.

Because of the smoke and congestion in the area, Bob chose to land on the access road about 300 feet from the crash. As the H-3 touched down, the police began to move the people away from the crash. No one was attempting to get to the wreckage. Was the pilot still in the plane?

Ben was waiting in the rear at the open side door. The mechanic was wearing asbestos

Downed Crop Duster

gloves, his Nomex flying suit, and his flight helmet with the visor down.

"Ben, check on the pilot and see if he got out," the pilot called. Ben jumped to the road with the two fire bottles and ran toward the crash.

A change in wind direction momentarily lifted the white smoke. For the first time the pilots saw the aircraft. "Sweet Jesus," whispered Danny, "that's Larry's plane!"

Before the major realized what his copilot was doing, Danny was out of his seat, running to the crash. He quickly passed Ben, who was struggling with the fire bottles.

A policeman saw Danny running toward the burning plane, but Danny made it to the cockpit. The cop grabbed Ben and yelled, "This thing may explode. It's got some kind of chemical on it."

Suddenly, the burning aircraft was propelled into the air by a tremendous explosion. The blast carried parts of the fuselage high into the air and spewed shrapnel out as far as the H-3. Policemen and bystanders were all knocked to the ground and, where the crashed aircraft had been, nothing remained except smoldering rubble.

Eighteen minutes after the explosion, the H-3 arrived at the hospital helipad. It was met by a mass casualty medical team which received 12 injured people. Five policemen had been injured; the remaining seven were onlookers the police had been trying to move away from the crash.

The crop duster pilot and his friend, the would-be rescuer, were dead.

The flight mechanic was unhurt, even though he and the policeman had been blown over ten feet by the explosion. The Nomex flight suit had singe marks from hot metal, but Ben was neither burned nor cut. Apparently, his flight helmet had protected him from the concussion of the shock wave, and his visor had shielded his eyes from the flying debris.

Investigators could find no reason for the crop duster crash. In spite of the explosion, there was enough of the plane left for investigators to determine that there had been no mechanical malfunction.

* * *

Maxie's Restaurant was filled with customers when Ruth heard the news of the crash on the radio. When the announcer mentioned the names of Larry and Danny, she dropped the tray of dishes she was carrying. Dazed by the news, she mechanically cleaned up the mess.

A few minutes later she had composed herself somewhat and was waiting on a young couple sitting in the same booth that Larry and Danny had occupied the last time she had seen them.

"They were sitting in this very booth, just yesterday morning," she mumbled.

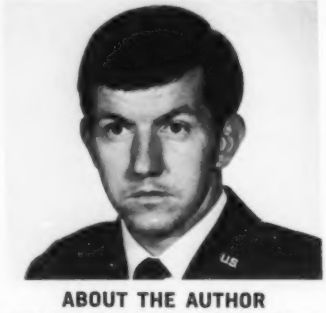
The young man smiled and looked up from the menu.

"Who was?" he asked.

Ruth didn't realize she had spoken her thoughts out loud.

"No one — nothing," she answered, managing a half smile. After scribbling down the order she walked slowly to the kitchen.

"Ham and eggs, over easy," she said softly to the cook, "two orders of ham and eggs."



ABOUT THE AUTHOR

Captain Duke is an Air Force reservist serving as a squadron helicopter pilot with the 301 ARRS. He was commissioned through AFROTC at Georgia Tech in 1967. A distinguished graduate from UPT, he was an instructor and select lead pilot at Charleston AFB, S.C. In 1972, he was standardization pilot (EC-47) for the 366 TFW at Danang. Captain Duke now is a commercial airline pilot.

Nomex Protection, A 50-50 Proposition

IN CASE OF FIRE . . . your best friend might be Nomex, but only if you meet it half way.

by Capt Michael E. Humphreys
1551 FTS
Hill AFB, Utah

The pilot fought his way through the burning wreckage of his crashed helicopter and exited through a rupture in the fuselage. With his fuel-soaked flight suit ablaze, he threw himself on the ground and rolled frantically to put out the fire. He escaped with minor burns, restricted to those parts of his body that were unprotected by his Nomex flight suit.

Lady Luck had little to do with the less-than-tragic outcome in this accident. The major contributors were Nomex and a knowledgeable aircrew member. It's important not to separate the two because the degree of protection provided by your flight suit depends largely on the "style" in which you wear it.

There's a right way, a wrong way, and even an in-between way to wear a flight suit. Zipping up halfway to expose your bleached white T-shirt or hairy chest or rolling up sleeves to reveal those bulging biceps may seem like good ways to maintain the masculine image of a Fernando Lamas. But if a fire breaks out with you dressed in such a swashbuckling manner, the result could be serious burns that might ruin your image permanently.

A great deal of research went into developing the Nomex, but many of us tend to judge it by sartorial standards rather than by its heat-resistant qualities — an attitude that could present a problem that one time in a million when the tranquility of a routine flight is suddenly transformed into a blazing horror. The point is, protection afforded by the Nomex can be negated by the wearer. Sure, it's cooler in the summer to wear it open and loose. But unless Nomex is worn properly, it may be no more effective than the old K-2B "green bag" of the past — which might have felt a lot cooler, but wasn't nearly as heat-resistant.

For maximum protection, the sleeves should be down and cuffed with gloves either under or over the sleeves so that no skin is exposed. This will also prevent heat or flames from funneling up the bare arm. Worn and frayed flight suits are also a danger and indicate that it's time to visit your friendly EMO. Air Force scientists ran fire pit tests on double layers of Nomex and found that they fared much better than the single layer of the Nomex flight suit. That being the case, then it's fairly obvious that a flight suit that has been worn thin won't provide the same protection as one of normal thickness. So replace your Nomex when it starts to wear. You might catch some flak from your unit budget officer if you walk in and request three or four new flight suits — but not if your flight suits are really worn.

Underwear for Protection

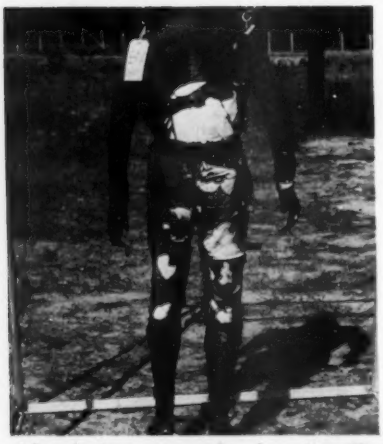
To prevent aggravating a burn, start your day with a shower and clean underwear whenever possible. Burns are bad enough without compounding them through possible bacterial infection from two-day-old B.V.D.'s.

Finally, don't overlook the value of long underwear. Don't laugh. During the fire pit tests on the Nomex, scientists clothed a mannequin with a standard Nomex flight suit and thermal underwear underneath. The dummy was unburned in the areas covered by the thermal undies — even though the Nomex was completely destroyed in certain sections.

Some Not So Fortunate

In the story above, the Huey pilot survived with minor burns. But here's another story with a not-so-happy ending; it makes an even stronger case for the proper wear of the Nomex.

50-50



After being exposed to burning JP-4 the Nomex looked like this.

In the same fire the old K-2B didn't fare too well.

Rescuers spotted an Air Force pilot surveying the wreckage of his single engine plane in a small village in Southeast Asia. Except for a few minor cuts and bruises, he was apparently unhurt. Apparently.

It was a typically hot, humid, SEA day — which is probably why the pilot had his sleeves rolled up and gloves rolled down. His hands, arms, and back were badly burned and he was immediately air evaced to good medical facilities. But complications arose and he died.

Nomex can save a life, but not by itself — it's a 50-50 proposition.

Superfabric of the Future

What will we see in the next few years as a follow-on to Nomex? A great deal of research has taken place since 1970 and the emerging leader is another DuPont fabric called HT-4. It has a considerably higher char point than Nomex (which chars at 700 to 900 degrees Fahrenheit) and the moisture regain capability (the capability to absorb and wick moisture throughout the fabric) is excellent. According to the program manager of the Life Support SPO at Wright-Patterson AFB, HT-4 may be introduced in 1977.

How good is this new "superfabric"? Generally speaking, your Nomex offers twice the protection of the old K-2B coverall; HT-4 should provide three times the protection of Nomex.

Spectacular? Yes. But remember, whether it's Nomex, HT-4, or a fabric of the distant future, the protection you get will still depend largely on how you wear it. So develop proper, safe habits of wearing your flight clothing. Make your style a "life" style.

Care of Nomex

Nomex is a convenient drip dry fabric. Just toss it in the washer, tumble or drip dry it, and it's ready to wear again. It can be laundered as frequently as needed.

Turn your flight suit inside out prior to washing; this will reduce "pilling" of the material. "Pilling" of the fabric causes it to burn at lower temperatures. Be sure and close all zippers prior to washing to prevent damage to the cloth and side fasteners. Keep zippers clean, free running, and sanitary by using a little paraffin or candle wax on the metal slide portion of the zipper. Commercial fabric softener will remove body oil and inhibit static generation.

Nomex flight gloves can be cleaned with warm water and mild soap. One way is to put the gloves on and wash with soap and water as though you were washing your hands. Rinse and remove the gloves, and squeeze — don't wring or twist — to remove excess water. Lay the gloves on a towel. Roll the towel to cover them, making sure the gloves don't touch each other.

Or you can go the washer/dryer route. On the wash cycle, use warm water — 140 degrees max — and tumble dry at no higher than 180 degrees.

A word of caution. JP-4, grease, starch, and other combustible materials can become embedded in the coverall or glove fabric. These agents will burn at their normal flash points even though the Nomex will not char until a much higher temperature is reached. So keep your Nomex as clean and free from foreign substances as possible.

Mishaps with a Moral

"...let her climb"

The Boeing Trijet, taking off on a ferry flight, flexed its wings skyward and was soon consumed by the dark, winter sky. The airliner intercepted a northwesterly track inland to its initial en route fix and climbed steadily toward a flight level which would take it through isolated areas of moderate-to-severe icing and turbulence.

As the aircraft passed 16,000 feet, its airspeed readouts began to increase for no apparent reason. Responding to the high airspeed indications, the pilot increased pitch attitude. Meanwhile, just under the cockpit, the ram air flow into the pitot system was beginning to decay as minute, supercooled water droplets froze upon impacting the pitot heads. Gradually, the pitot tubes became sheathed with an envelope of ice and the drain hole stopped venting atmospheric moisture overboard. Then, the ram air inlet hole iced over and pressure was trapped downstream in the airspeed indicating system.

Fatal Interpretation

The crew was unaware that their airspeed indicators now reflected increasing altitude instead of airspeed. The altimeter, unaffected by the totally iced-over pitot heads, continued to show a steady clockwise movement toward flight level 310. Although not in complete concert with the altimeter, the airspeed pointers steadily crept upward toward limiting "barber pole" speed. Offsetting "increases" in airspeed, the pilot further adjusted pitch attitude.

As the aircraft passed 23,000 feet, its attitude became excessively nose high. But the airspeed indicator showed 405 knots. Glancing at his airspeed indicator, the captain commented.

"Would you believe that."

"I believe it. I just can't do anything about it," commented the first officer, flying the aircraft from the right seat.

"No, just pull her back; let her climb," replied the captain.

Seconds later the aircraft overspeed warning sounded; then the aircraft stall warning system activated. Apparently mistaking the stall warning for an overspeed warning, the first officer commented.

"There's that Mach buffet; guess we'll have to pull it up."

"Pull it up," advised the captain.

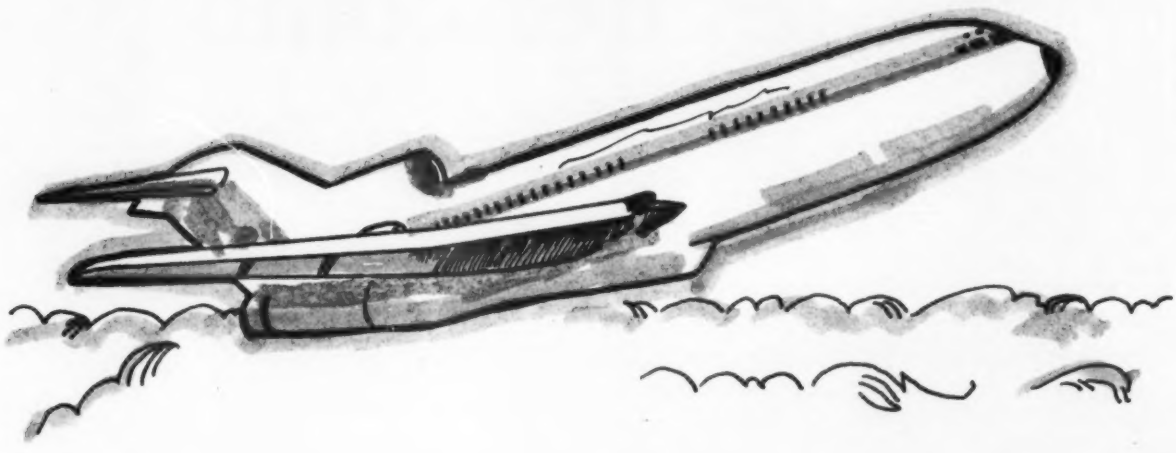
The pilot, assuming that his aircraft was overspeeding, retarded the throttles. The aircraft stalled and plunged earthward. Pegged-out airspeed indicators and overspeed warning alarms had influenced both pilots into thinking that their aircraft was exceeding its high airspeed envelope when, in reality, it had breached the lower end of its operational envelope.

As the plane wound into a tight spiral, its rate of descent exceeded 17,000 feet per minute and G-loads ripped off the left horizontal stabilizers, rendering recovery attempts futile. The crew of another airliner in the area heard the following transmissions from the spiraling aircraft: " . . . out of control descending through 20,000 feet," and finally, "We're descending through twelve; we're in a stall." The airliner crashed in a wooded area, killing its three-man crew, the only occupants aboard.

Moral

Sifting through the wreckage, investigators found that both pitot heat switches had remained off throughout the brief flight. Voice recorder transcripts verified the flight engineer's calling "Pitot heat" prior to taxi and the first officer's response, "Off, then on." Procedures also call for the flight engineer to check pitot heat amperage. Apparently, for unknown reasons, the litany of checklist challenge and response failed at a critical item — the pitot heat.

Other significant aspects of this accident involved the interpretation of control and performance instruments, the unrecognized symptoms of pitot-static system malfunction, and stall recognition and recovery procedures. For example, is a transport-type aircraft, established in a normal climb profile,



capable of maintaining 10 to 15 degrees of nose-up pitch (indicated on the attitude indicator) and simultaneously exceeding airspeed limitations? Most pilots probably would suspect instrument error in the event their instruments reflected such a phenomenon. But which instrument is telling the truth, the attitude instrument or the airspeed indicator?

While it is simple to quarterback the day after an event, there are points that should be considered in the discussion of this accident. One is that attitude and power instruments are essentially self-contained and independent of external inputs. Conversely, pitot-static instrumention (airspeed, Mach, attitude, vertical velocity) is dependent primarily upon outside inputs which may change rapidly and momentarily cause erroneous instrument readings even when instruments are operating properly. This same outside phenomenon can also cause pitot-static malfunction — as it did in this accident — that may render some instrumentation completely invalid.

A rule of thumb for combating the enigma of conflicting instrument presentations is to maintain a known attitude and to use appropriate power settings per the particular phase of flight desired (climb, cruise, descent). Once basic aircraft control is (re)established, performance instrument validity and reliability can be determined.

Since a stall was the consequence of following malfunctioning instruments in this accident, stall recovery procedures also played a major role in its fatal conclusion. Stall maneuvers in large transport aircraft are rarely used out of necessity. But the possibility of stall does exist and prompt recovery must be initiated or excessive G-loads and aerodynamic loads may cause the aircraft to break up. In order to recover from such an upset before the aircraft is out of control, a pilot must be able to recognize the stall characteristics of his aircraft.

Flying has come a long way since the old VFR, stick-and-rudder days; however, instrument flying requires a type of skill that would tax many of the old timers. And in spite of sophisticated instrumentation, component failures (and human error in the cockpit) can cause most systems at one time or another to transmit perplexing bits of data to its crew. Recognizing such anomalies for what they are is sometimes difficult. Often, a pilot must selectively bias out some of his most "sacred" instruments to properly interpret the actual situation or flight regime of his aircraft. The alternative to prompt and accurate instrument interpretation may be to unknowingly place the aircraft in a maneuver from which the chances of recovery are extremely slim.

Adapted from National Transportation Safety Board
Report Number NTSB-AAR-75-13

"sinking to ten..."

As the outer marker audio signal strengthened, the first officer advised the captain, "Now we're at a thousand feet above minimums — no flags." The weather was IFR and the winds gusty.

"Right on glide slope," commented the captain as he concentrated on his ILS indicators. Simultaneously scanning his instruments and peering outside into the foul weather, the first officer sighted the approach lights about a minute after the airliner passed the outer marker.

The captain looked ahead and verified that the approach and runway lights were in sight. Then he refocused his attention on his instruments. Seconds later the airliner entered heavy rain.

"Put 'em on fast," the captain directed.

The first officer turned the windshield wipers on high. As the plane neared the middle marker, he called, "One hundred above minimums."

Then, as the aircraft passed the middle marker, "Plus ten [knots]. That's minimums."

Three seconds late, he added, "I got a plus five, sinking to nine [900 f.p.m.]."

The captain uncoupled the autopilot at decision height. At this point, both flight director and ILS raw data displays were centered and the runway picture appeared normal to the captain.

A few seconds later, the first officer cautioned the captain, "Plus five, sinking to ten."

Suddenly the visual presentation of the runway flattened out. Realizing that he was too low, the captain advanced throttles and applied back pressure. But in spite of his efforts to decrease the rate of descent, the aircraft touched down on the approach lights and struck a flood control dike 785 feet short of the runway threshold. The plane began to break up and came to rest beside the runway. Four crew members and 38 of the 74 passengers were injured.

Analysis

Investigators noted that the crew had conducted a well-organized and well-disciplined approach until uncoupling the autopilot at decision height. At this point, the captain disregarded the first officer's warnings of excessive sink rate. Distorted runway perception, the absence of VASI, and wind shear problems contributed to the pilot's misjudgment.

During the approach, at between 2,000 and 1,000 feet, the headwind decreased by 17 knots. The effect of a rapidly decreasing headwind caused a corresponding increase in the ground speed. To compensate, the autopilot increased aircraft nose-down trim to keep it on the glide path. In doing so, it apparently trimmed out significant forces before it was disconnected at decision height. And when the captain disconnected it, the aircraft was established in a descent profile that resulted in touchdown short of the runway.

Another factor which may have contributed to the accident was the pilot's perception of the runway through the heavy precipitation on the windshield. The water on the windshield, the thickness of the windshield, and the amount of rain between the aircraft and the runway may have caused a refraction of the pilot's line of sight. This would result in the approach and runway lights appearing lower than their actual elevation and would cause the pilot to think he was higher and farther away from his planned touchdown point than he actually was.

Moral

The National Transportation Safety Board determined that the probable cause of the accident was the pilot's failure to recognize the need to correct an excessive rate of descent after the aircraft passed decision height.

* * *

With winter in full swing now, low ceilings, precipitation, and poor visibility are common throughout much of the world. Aircrews should renew their awareness of the factors that figured in this mishap — a classic example of why the final stages of an approach demands split second scrutiny and evaluation of many parameters.

Adapted from NTSB Report Number NTSB-AAR-74-13

Fatigue, A Tiring Subject

Pilot Fatigue — progressive decrease of efficiency together with a feeling of loss of control occurring in aviators. — *Dorland's Illustrated Medical Dictionary, 24th Edition.*

Doctor, my eyes burn and my rear end's dragging. What's happening?

Dorland's definition of pilot fatigue is accurate — as far as it goes. But it really doesn't go far enough because feelings of control loss occur in the late stages of fatigue. More important to aircrew members are the subtle effects of fatigue that occur long before this. These subtle effects can alter performance just as much as alcohol or hypoxia — and without our knowing it.

If you've been around long enough you may know from firsthand experience that there are three basic types of fatigue: physical, operational, and chronic.

Physical fatigue is the most commonly experienced and is pretty well self-explanatory. You may have suffered from it after strenuous physical exercise, such as the annual aerobics run. This type of fatigue produces measurable changes in body chemistry and is easy to identify and correct. A good night's sleep usually brings complete recovery.

Operational Fatigue

But a more dangerous form of fatigue, for aircrew members, is operational, or skill, fatigue. This is distinguishable from physical fatigue in that its cause is primarily mental, not physical. Its symptoms are also mental and, as a result, you may be unaware that it is working to sap away the judgment required to perform your aircrew duties.

What produces this type of fatigue? Many things. But the one in which we're primarily interested is a typical MAC operational mission. Monotonously long missions, boredom, and long periods of inactivity can spell danger by causing you to lose interest in what's happening in the cockpit.

What are some of the symptoms of operational fatigue? A few years ago an Air Force flight surgeon determined that fatigue in pilots is manifested by:[1]

1. Decreased coordination that results in over- or under-controlling of flight controls.

2. A narrowed span of attention, resulting in a tendency to forget important elements of sequential tasks, failure to scan the instrument panel, and a tendency to "fix" on one instrument to the exclusion of equally vital instruments.

3. The acceptance of lowered standards of accuracy and performance.

A pilot (or any other crew member) exhibiting these symptoms can be dangerous. But in spite of the ominous nature of operational fatigue, there is one bright note. Operational fatigue is largely reversible. Any event which breaks the monotony may restore your skill and attention to a normal

by Major Lowell A. Schuknecht, Jr.
MAC/SGPA

level. An in-flight emergency or near miss is the hard way to overcome fatigue, but these are the types of things that can do it. On the other hand, even preparations for landing can often wipe away the fog in the cockpit.

Chronic Fatigue

The third form of fatigue is called "chronic." You've all heard of it. AFR 60-1 and MACR 55-1 delineate flight time limitations to prevent the buildup of this malady. You may experience chronic fatigue when operational requirements dictate maximum effort missions over prolonged periods. If insufficient rest and recreation prevent complete recovery from the preceding mission before the next one begins, your reserves deplete steadily. This causes skill fatigue to occur earlier in each mission and with less provocation. Its victims become enmeshed in a steadily tightening spiral of lowered resistance. Irritability, poor job performance, and a tendency to cut corners are symptoms of this form of fatigue.

Managing Fatigue

So, we've considered various forms of fatigue. But how can we manage it? Theoretically, any degree of fatigue is undesirable. In the real world, however, we should recognize that fatigue is a natural result of any demanding activity. Since a flying unit cannot accomplish its mission without flying, we must accept certain amounts of fatigue as a result of mission-oriented activity.

Your unit flight surgeon is well aware of this. He considers ways to minimize your fatigue. He considers your total flying environment and tries to determine its fatiguing aspects. He looks at your crew rest facilities for adequacy and he's concerned with the fit of your personal equipment. He considers your mental and physical condition and your eating, drinking, and smoking habits. He evaluates the design of your cockpit facilities in terms of seat comfort, lighting, and noise levels.

A lot of people, from your commander on up the line, are concerned with the effects of fatigue. But what can you do to prevent fatigue from reaching the danger level?

For one thing, remember that the onset of acute skill fatigue may sneak up on you. Fight it by mentally challenging yourself. Recheck your instruments, recheck your position, and review your navigation charts and letdown plates. Get up and move about frequently, stretch your muscles, and make up tasks like timing yourself on quick-donning your oxygen mask.

Do your best to get adequate rest — not only physical, but mental rest as well. Develop outside interest and hobbies. Leave your job-related problems at the office and don't bring domestic problems into the cockpit. Keeping in good physical condition by participating in sports is an excellent means of fighting mental fatigue.

Be on the lookout for indications of chronic-fatigue buildup. Perhaps your living habits aren't getting you through those long flying days very well. If this is happening to you, see your boss and your flight surgeon. You can be sure that neither consider you expendable! To help with your problem, though, they must know that it exists.

1. Wittmer, James F., Col, USAF, MC. "Don't Be a Tired Tiger!" *ATC Aircrew Information Bulletin*. September 1967.

The MAC Line Revisited

by Lt Col John W. Ray
Supervising Editor

Refueling from the right side. But where's the basket?

. . . . Ah, there it is. Now here's how to make contact.

Each year, editors of THE MAC FLYER attempt to visit "in the field" at least once in an effort to keep abreast of what is happening in what we like to call "the real world."

The trips allow us to become acquainted with aircrew members — the bread-and-butter of MAC — and to learn their views on operations and safety. Ideally, these annual visits should permit a well-planned, carefully followed itinerary that provides maximum exposure of the system.

But, as usual, the availability of air transportation was the deciding factor in our final itinerary on this trip. This editor did, however, manage to make most of the planned stops.

These included stops at Hill AFB, Utah; Travis AFB, Calif.; Salina Airport, Kan. (on a Reforger aircraft); Dover AFB, Del.; Rhein-Main AB, Ger.; RAF Mildenhall, U. K.; McGuire AFB, N. J.; Andrews AFB, Md.; and, of course, back to Scott.

The trip provided a few interesting "firsts" for the editor: an HH-3 refueling mission with the 15501st ATW at Hill AFB, a flight on a C-5, and a tactical drop mission on a C-130.

Steel Nerves at Hill

If you've never seen a helicopter refueling exercise from inside a chopper, you can't fully appreciate the degree of skill required for the maneuver. Unlike some other types of in-flight refueling, in helicopter refueling it is the helicopter pilot who must make the final hook up, not the boom operator. The chopper pilot positions his bird for the hookup by aiming for a dangling hose with a basket-like device on the end. Flying helicopters is basically very different from flying fixed wing birds, anyway. And this particular maneuver is a refinement that takes steady nerves as well as a great deal of skill.

Travis AFB

Conversations with some of the aircrew members of the 75th MAS at Travis AFB whetted the old appetite for flying on one of their C-5's. The crews I talked with were convincing in their pronouncement that the Galaxy is the "Cadillac" of the airlift business. So I signed on for a C-5 flight from Travis to Salina Airport, Kans., to Dover AFB, Del. Ironically, the flight was not manned by 75th aircrews, but by an all-Reserve crew from the 312th MAS at Travis. But the expectations of the C-5 were met. It is, indeed, the "Cadillac" of the fleet. The flight also left another impression, which would be

bolstered on subsequent flights — that Reserve crews are doing a lot of flying.

It was early afternoon on Saturday when the C-5 touched down at Dover AFB (do C-5 pilots always grease it in like that?). The Reforger and several other exercises were in progress and the MAC traffic between the States and Europe was heavy. But, the ops center controllers were keeping their cool and, thanks to their cooperation throughout the next 12 hours or so, we arranged for a flight the next day to Rhein Main AB.

Rhein Main

Rhein Main is a virtual MAC stronghold. It is also the home of the 2d AES and its C-9's and the 435th TAW with its C-130 rotation squadron. The unit was in the midst of switching over from crews of the 774th TAS, Dyess AFB, Tex., to those of the 41st TAS of Pope AFB, N. C. Unfortunately, our scheduled one-day trip with "Delta" squadron was scrubbed at the last minute. But all was not lost. The next evening a C-141 reserve associate crew from McGuire AFB, N. J., sent us winging toward RAF Mildenhall. This is the home of another "rote" squadron, which at the time was manned by the spick-and-span aircrews of the 32d TAS, Little Rock AFB, Ark.

"Bravo," Mildenhall

Squadron "Bravo" just happened to have an equipment drop scheduled, and the following day we were doing "their" thing — bearing down on a drop zone in the fenlands of England. This was the editor's first drop from a C-130 and didn't seem drastically different from drops in a C-119 or C-124.

MAC's "Cadillac," the C-5, with an all-Reserve crew.

All set for a C-130 drop mission — and checkride — at RAF Mildenhall.

But when the crew explained the features of some strange-looking gadgetry called SKE (station-keeping equipment), it became obvious that tactical flying has been refined appreciably in recent years.

For you aircrew members who enjoy the "bare knuckles" flying of tactical airlift and visiting foreign lands, these two MAC squadrons would appeal to your aviation instincts — if you don't mind being away from home for two months at a time. Many consider this mission the last of the "really good" flying.

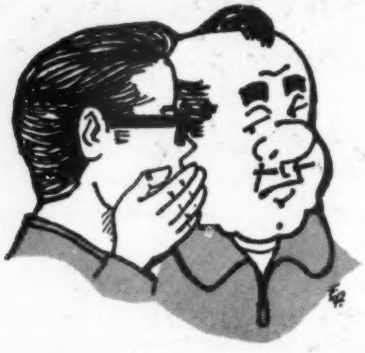
Some Long Days

Flying the MAC line has not changed a great deal from five years ago. Even on our fast jets, a crew can still get pretty beat during a 16-hour crew duty day, particularly when flying through several time zones after an oh-no-hundred alert. Sufficient predeparture crew rest is a must. In retrospect, the 20-hour crew duty days of the Southeast Asia operation seem almost unreal. Fortunately, such demands on today's crews are seldom necessary. And just for the record, it's still difficult to find a meal at some of the bases during late evening arrivals. And the possibility of having to crew rest off base still exists at some places.

This short visit into the system helped update us on the comings and goings of MAC aircrews and also served to bolster the impression that of all the commands with a flying mission, MAC is the most diversified — and the MAC troops are doing a bang-up job!

In searching for some meaningful and appropriate (to the flying business) New Years resolutions, a TMF staffer stumbled upon the integral crew of one Maj C. R. Terror on a two-hour layover at Scott AFB. C. R., Sammy, Blinky, Max, and Ty were very cooperative and their resolutions appear here, complete and unabridged.

* * *



FROM THE DESK OF MAJOR C. R. TERROR

Though 1975 has been a year of terrorific success and it is difficult to improve on perfection, I stubbornly hereby resolve:

- to listen to Blinky when he says I'm too low, to listen to Sam when he says I'm too high, to Sergeant Downs when he says I'm too heavy, and to Sergeant Torque when he says I'm too much.
- to brief my crew didactically, understanding their human fallibility and the importance of relaying my awe-inspiring knowledge to them.
- to make Tassel's terrorific'tinis a trifle drier.
- to keep smiling although the strain of responsibility, the loneliness of command, and the tardiness of Fleet Service demand otherwise.

Some New Years Resolutions

I, Long Suffering Sam, Capt, USAF, Bag Boy and Horse Holder for the World's Finest Aviator, do hereby resolve:

- to aid and abet my fearless leader in the performance of his duties.

- to speak out when I see something awry, even though I know I'll catch hell.
- to read each checklist item and secure proper response.
- to never be too embarrassed to tell the boss when he's too high, too low, too hot, or too slow.

● to be prepared to assume command of the machinery should The Great One falter.

* * *

I, Blinky Betelgeuse, 1st Lt, USAF, truth-seeker, expert in coriolis, cosecants, tangents, Radio Detection and Ranging, and other things not understood by pilots, do hereby resolve:

● to ascertain that we have enough fuel to reach destination prior to departing terra firma.

● to advise the Field Grade Fumbler of any cumulonimbus in our ethereal path.

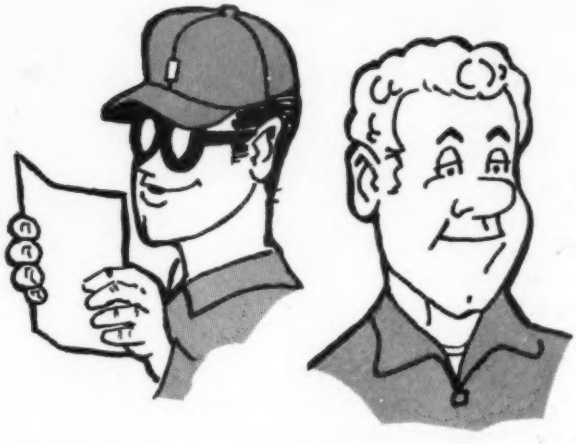
● to manifest all my mystical powers in preventing the collision of my boss's bird with the ground (except at proposed landing sites) or other aircraft.

● to copy clearances faithfully.

● to give heading changes in not less than one-degree increments for Sam and not less than five-degree increments for Major Terror.

● to track my aircraft from liftoff to touchdown as though my life depended on it.

* * *



I, Maximus Torque, MSgt, USAF, Former Bender of Throttles, Master Fuel Mixer, and now Erstwhile Expert of EPR's, Airframes, and Powerplants, do hereby resolve:

● to advise the Good Major when he's overboosting the Pratt and Whitneys.

● to coordinate with the navigator prior to interrupting electrical power effecting his machinery.

● to inform Major Terror of any system malfunction, no matter how minor.

● to conduct each preflight as though our capability to sustain flight depended on it, which it probably does.

* * *

I, Ty Downs, TSgt, USAF, Aircraft Weight-Watcher, Form F Manipulator, Pax Specialist and Baggage Handler, do hereby resolve:

● to carefully guard the Major's Guam Gallon.

● to advise the AC when his load of hibachi pots will put the CG out of limits.

● to coordinate with the navigator and engineer on my Form F totals.

● to never overcook the Skipper's frozen filet.

● to inspect cargo before onload for errors in weight and, particularly, concealed hazards.

* * *

Meaningful? Appropriate? You might have to read between the lines to come up with the real philosophy of the world's number one integral crew. Their secret to success is working together, keeping everybody advised. Even ole C. R. begrudgingly admits to that, in spite of his penchant for forgetting resolutions that interfere with his personal brand of airmanship.

And whether or not your crew bothered with New Years resolutions, those made by the infamous integral crew of C. R. Terror are worth pondering as a new year begins.

The Controller

A basic principle of the air traffic control system is stated in the Federal Aviation Regulations as the "pilot in command of an aircraft is directly responsible for, and is the final authority as to, the operation of that aircraft." Another historic premise is that air traffic control clearance is limited to the purpose of preventing collision between known aircraft and allowing an aircraft to proceed under specified conditions within controlled airspace.

The entire concept of pilot-controller responsibility is tied up in a neat package in the Airman's Information Manual: "If ATC issues a clearance that would cause a pilot to deviate from a rule or regulation, or in the pilot's opinion, would place the aircraft in jeopardy, it is the pilot's responsibility to request an amended clearance." The manual goes on to say that "the pilot in command of the aircraft shall not deviate from the provisions of an ATC clearance unless an amended clearance is obtained."

The historic picture is clear. Controllers are responsible only for the separation of known aircraft and pilots are responsible for all other phases of flight — including severe weather avoidance. The current situation is not that crisp and clear, and the controller finds his plea of not having any responsibility for assisting pilots in avoiding terrain, windshear and thunderstorms falling upon deaf ears as accident investigation dramas are unfolded to the public eyes by the media.

A Fresh Look

It is not my purpose to argue what the current rules say, or fail to say, or what any controller or pilot did, or failed to do, in any specific accident. Rather, I hope we can take a fresh look at the controller, the pilot, and the weather with the objective of formulating a system that will increase flight safety by making better use of available tools, skills and information.

The most productive area to examine is weather. According to the National Transportation Safety Board, weather is the most frequently cited causal factor in general aviation fatal accidents and has been for several decades. We all know that weather plays an equally important role in air carrier accidents, as even the best professional pilots sometimes encounter weather conditions beyond their capabilities.

The subject of "weather" is much too large for a short presentation. Therefore let's concentrate on "severe weather" for the moment. While there are no universally agreed upon definitions of "severe weather" the principal concerns to most pilots are:

— any thunderstorms in the path of his airplane, especially in a terminal area.
— low level windshear.
— heavy precipitation.
— icing.
— strong cross winds and gusts.
— wake vortices.

Controllers may say that all this is interesting but that FAR 91.5 requires each pilot in command to familiarize himself with weather reports and forecasts before beginning a flight and that ATC is responsible only for separating aircraft.

Historic Relationship

Let us consider changing the historic pilot-controller relation-

and Weather

Where does the role of the Air Traffic Controller end and that of a pilot begin? An authority discusses this as it relates to weather avoidance.

by David D. Thomas
Consultant to the General Aviation Manufacturing Assn and Pan American Airlines

ship to one where the pilot is responsible for all the things he can control, or knows about, and the controller is responsible for assisting and advising the pilot for things the controller knows about but the pilot does not. Specifically, let's bring the controller into the weather loop in a positive, programmed and official basis.

The controller has long been in the weather loop to varying degrees. In airport traffic control, wind direction and velocity are predominate factors in selecting active runways. Visibility and cloud heights have long determined whether operations could be conducted under visual flight rules.

The spacing between aircraft in terminal areas is more dependent upon the possibility of wake vortices than on runway occupancy times. En route controllers have provided excellent service in providing vectors to steer aircraft around threatening weather cells.

When radar was first introduced into air route traffic control the radar presentation was a welcome relief from "manual separations standards" used whenever radar was not available. Controllers shuddered when the thunderstorms rolled in and they watched the scopes develop weird blotches which obliterated aircraft tracks. Many of us vowed that we would clean up the radar displays by eliminating weather returns.

Clean Scope Radar

As time passed, more and more radar data became "processed" with "raw" radar becoming less useful until finally the day of the "clear scope" arrived and the controller watched only radar beacon returns with neat alpha-numeric tags attached.

Pilots and controllers alike want the controller to have a display that will enable the controller to see all air traffic. Both want the controller to know where severe weather is located so that the controller may assist in weather avoidance.

Previous attempts to outline severe weather on clean scopes containing alpha-numeric information have not been too successful. The controllers should have at their fingertips weather information from radars whose sole purpose is to detect and depict weather. It is suggested that a useful exercise would be to consolidate the displays from National Weather Service radars and display the weather information in a form convenient to the controller. This would allow him to refer to it without detracting from the advantages of his clear scope free of weather returns. Providing such a consolidated display in each sector or terminal area does not appear to be a major technical or economic problem if digitized information is used.

Another useful bit is information on the tops of thunderstorms as well as their geographical extent. While there has been little definition of thunderstorm intensity in terms of height, it is apparent that a thunderstorm more than 50,000 feet high contains much more energy than one which is 20,000 feet high. Additionally, the 20,000-foot junior size can be overflown by many airplanes whereas the 50,000-foot variety must be circumnavigated by all civil aircraft.

Windshear & Wake Vortices

The most talked about weather

subject in aviation today is "windshear." Unfortunately, there is no operational capability to read and report windshear except by aircraft experiencing it. If a pilot experiences too much of it too low on the final approach course, the final point of impact may not be the runway.

At the present time, acoustical radar, such as that used to measure wake vortices, is probably the most effective tool for measuring windshear provided that precipitation is not too heavy. But windshear does occur in heavy precipitation. The answer is either to improve acoustic doppler radar to overcome the noise of the rain sufficiently to detect windshear or to develop other radar techniques which do the job. Regardless of the answer to the technical question, a windshear detection system must be developed and should become part of the air traffic control system.

Another important element is that weather created by aircraft called wake vortices. It has been demonstrated that wake vortices can be detected by acoustical radar but there is no program for installing the radar. Acoustical radar is expensive but so are large and unnecessary separation standards. The present separation standards are based upon a possibility that wake vortices may exist rather than on certain knowledge that they do. If wake vortex detectors were available, the controller could use reduced separation standards on those days when the vortices dissipate rapidly and increase standards on days when he could see that vortices continue to dance in the approach path.

The controller needs a precise tool at the major airports to determine the existence of wake vortices so that he can truly arrange for the safe, orderly, and expeditious flow of traffic.

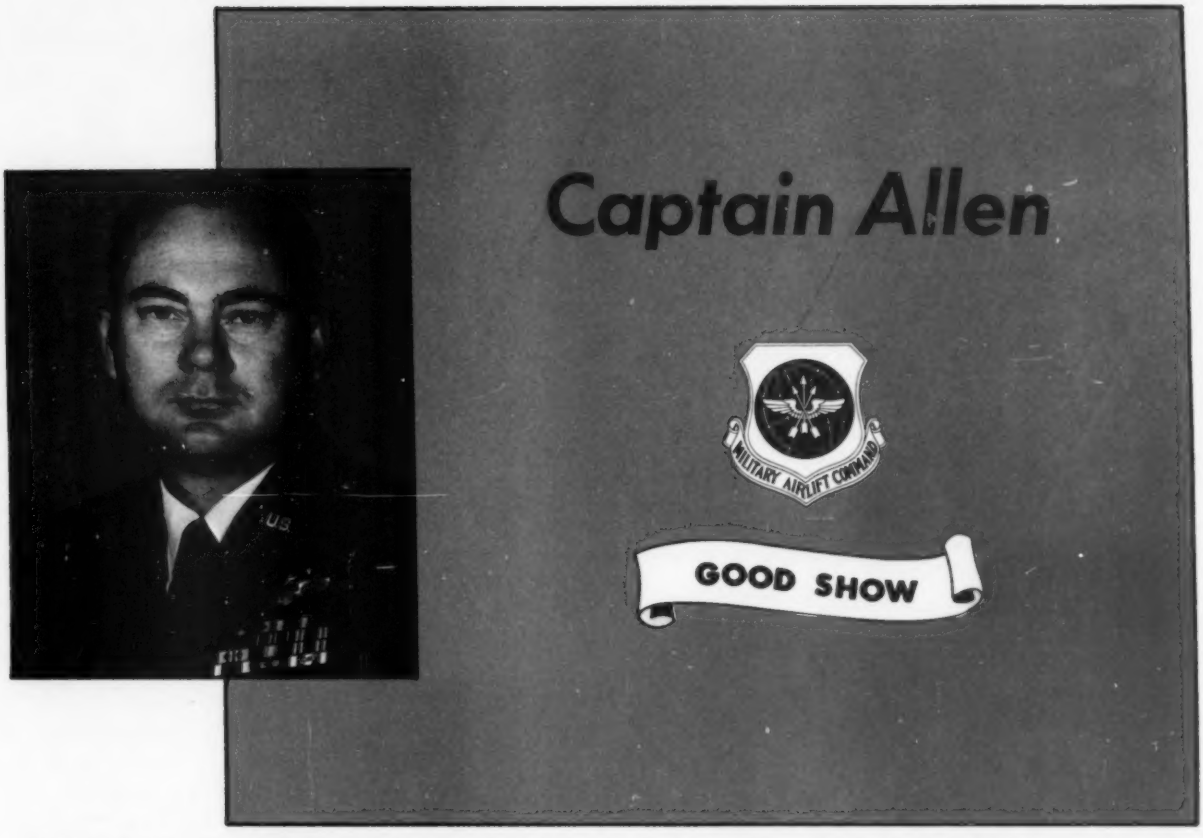
In summary, let's make weather information available to controllers in a useful form so that he may assist pilots in avoiding severe weather. Some work in these areas is now underway, such as acoustic radar tests, controller and flight service specialist access to computer-stored weather data, and stationing of meteorologists in air route traffic control centers. The planned collocation of consolidated FSS facilities with ARTC centers is a big step forward. All of these are good and excellent measures, but they are the mere beginnings of a truly effective system.

I am making no implication that the air traffic control system is not safe, as indeed it has performed its assigned mission well. Every controller can feel proud of his part in making the U. S. Air Traffic Control System the best in the world. I personally feel very proud of any small role that I may have played in the development of the system and I make no apologies for it. My purpose is merely to indicate that times and techniques are changing and that we need more tools to make the system safer in severe weather. These tools, when given to the controller, can and will be used to make the honored creed of "safe, orderly and expeditious flow of traffic" more meaningful with regard to safety.

Presented to the Air Transport Association of America operations conference at Atlanta, Georgia.

ABOUT THE AUTHOR

Mr. Thomas served with the CAA and FAA for many years and is presently a consultant to the General Aviation Manufacturing Association and Pan American Airlines. Formerly president of the Flight Safety Foundation, he is known as one of the most influential protagonists on air traffic control in the United States. Among the awards he has received for his work are the Department of Commerce Meritorious Service Award, the Medalion Award of the Air Traffic Control Association, the Laura Taber Barbour Air Safety Award, the President's Award for Distinguished Civilian Service, the Civil Service League Award, the Rockefeller Public Serice Award, and the Monsanto Air Safety Award.

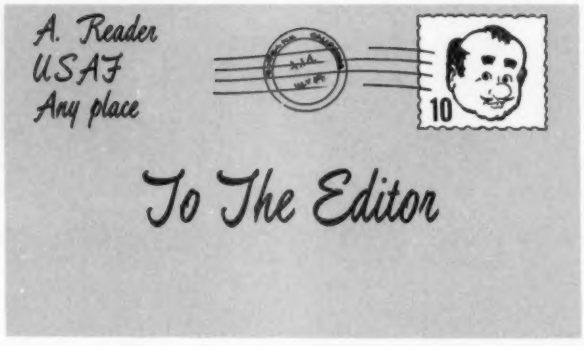


.While on an evening training mission Capt Roy M. Allen and his UH-1N crew of Det 18, 39 ARRS, Plattsburgh AFB, N. Y., were diverted on an emergency Military Assistance to Safety and Traffic (MAST) mission. Captain Allen flew his UH-1N to a town 40 miles northwest of the base where he and his crew picked up a six-year-old child who had suffered a fractured skull in an auto accident. The child was airlifted to a hospital in Plattsburgh; the crew was credited with saving his life.

Following the mission, Captain Allen flew back to the base and began an approach. When the helicopter had reached an altitude of 50 to 100 feet above the ground, the crew heard and felt an engine explosion which was accompanied by the illumination of the low rotor r.p.m. light and warning horn. Realizing that the aircraft had experienced complete power loss on both engines, Captain Allen entered autorotation and flew his helicopter to a slide-on landing on the taxiway.

Subsequent investigation revealed that the power turbine section of number two disintegrated and shed turbine fragments through the titanium firewall into the turbine section of number one, causing its immediate failure.

Captain Allen's prompt analysis and superb response to complete power loss in a critical regime of flight prevented a major aircraft accident and injury to the crew. Good Show, Captain Allen, for a topnotch performance.



Letters To The Editor

Airline Safety Efforts

We were very interested to note in the August issue of THE MAC FLYER your articles concerning the development of terrain clearance charts. We hope that your studies will produce charts which will be useful as a cockpit aid in commercial aviation as well as in military operations.

I thought you would be interested in what Overseas National is doing in the way of providing our cockpit crews with an additional tool and safety procedure.

Following three air carrier accidents involving aircraft which flew into mountains during the arrival phase of flight, we instituted at ONA an additional altitude awareness program. We placed on each aircraft a set of colored terrain maps for every airport into which we operate or are likely to serve. In my judgment, a safety hazard exists by virtue of the absence of terrain and obstacle information on U. S. published terminal area and en route navigation charts. I might add here that in the course of our research, we discovered that some international carriers do display the location and elevation of the highest terrain/obstacle on their instrument navigation charts in addition to minimum en route and off route altitudes on specific tracks.

Our Terrain Manual consists of two volumes containing approximately 150 8½" x 11" plastic enclosed cutouts from Operational Navigation Charts (scale, 1:1,000,000) covering all the destination and alternate airports we would normally operate into, both domestic and foreign. New plates are made and issued to the aircraft each time ONA is scheduled to operate into a destination not previously served. The standard Jeppesen approach plates used by ONA depict minimum safe altitudes within a 25 n.m. radius of the facility being used without specific obstacle location or height information beyond the area covered by the approach plate. The full color charts in the Terrain Manuals provide topographic information within up to a hundred mile radius of the airports. Additionally, a full set of ONC charts for the areas of the world in which ONA operates are aboard each aircraft to provide topographic information for flights or diversions to airports which have not been covered by individual terrain charts.

It has long been ONA policy that the pilot-in-command sign a statement prior to departure that he has studied or otherwise caused himself to be briefed on the terrain and obstacles in the departure area, en route and in the terminal area. Likewise, a review of the approach plate and terminal chart is mandatory by both pilot and copilot for each departure and each arrival, irrespective of weather conditions, no matter how familiar the pilots are with the airports being used or how frequently or recently the pilots may have served them. Taking this a step further, we now require the pilot and copilot to study and brief each other on the terrain plate before each departure and arrival exactly as they do the approach plate.

Our flight control section has a complete set of the three volumes (one separate volume is used for DC-9 aircraft covering the U. S. and Caribbean) of terrain charts. The flight release message authorizing a DC-8/10 flight to a destination not in the index will state which WAC chart will contain the topographic information. Basically, these charts are intended to supplement the Jeppesen route manual and we consider this information an additional margin of safety which provides terrain and obstacle information which may be necessary for the safe conduct of flight.

Also for your information, I am enclosing two pilot bulletins which describe in some detail the philosophy behind these terrain charts and the procedure for using them. The procedure has been widely accepted by our flight crews and the United States Federal Aviation Administration has heartily endorsed our terrain plate system. We think this is an added step in closing a safety information gap within our control. We hope that by providing an added margin of safety of operations into unfamiliar areas we have further motivated our people to observe the highest standards of safety and altitude awareness.

We will be watching closely for further development of your proposed method of solving terrain clearance problems.

Winston O. Defieux
Vice President-Corporate Development
Overseas National Airways
John F. Kennedy International Airport
Jamaica, N. Y.

★ Thank you very much for your interest in the Air Force efforts being made to ensure terrain clearance and for the information on Overseas National's efforts along the same lines. As this issue went to press, the final version of the Air Force cockpit device had not been distributed.

Biorhythms

Since reading the article, "Biorhythms," by Maj Weaver in your April 1974 issue, I have become increasingly interested in the topic and its implications for flying safety.

I am currently an AFIT student at the University of Alabama in management science. As part of my master's project I am investigating the use of biorhythms as a management tool and have developed several computer programs to generate "bioplots." The greatest problem I am having in my studies is finding information concerning the topic.

I am assuming that since that article

you have received other letters concerning this topic and hope that you will be able to provide me with information and/or put me in contact with someone who can.

One problem I have been able to solve is to "teach" the computer to compute the total number of days a person has lived (days between dates) without the aid of a calendar (the computer can't read one). The algorithm may be of interest to some of your readers and is included below. I am using the example from your article to illustrate the method. You will note that my method produces the answer 4,722 instead of 4,723, which was the answer given in the article. I believe 4,722 is the correct number.

With a hand calculator and the following four-step algorithm, the solution to the following is simple.

Given: Two dates, D1/M1/Y1 and D2/M2/Y2.

Find: The number of days between dates.

Solution:

1. A=(D2−D1)+((Y2−Y1)365)
2. B=f(M1)
   If M1≤2 B=(M1-1)31
   If 2<M1<9 B=(M1−1)31−INT((M1+3)/2)
   If 9≤M1 B=(M1−1)31−INT((M1+2)/2)
   where INT( ) means "the integer part of ( )"
3. C=f(M2)
   Solve as in step 2
4. T=A−B+C+ number of leap years
   If Y1 is a leap year but M1 > 2 disregard Y1
   If Y2 is a leap year but M2 < 3 disregard Y2
   } in leap year factor

Example: birth 27/6/60; current date 1/6/73

1. A=(1−27)+(73−60)365 = 4719
2. 2<M1<9 so B=(6−1)31−INT((6+3)/2)=155−4=151
3. C=151
4. T=4719−151+151+3=4722

I hope that the days-between-dates algorithm will be helpful to some of your readers and that you will be able to assist me in a research which may contribute to improved safety for aircrews in the future. Any help you can give will be greatly appreciated.

Forrest V. Schwengels II, Capt, USAF
84 Harper Sub
Northport, Ala. 35476

★ Thanks for your letter and the "simple" solution. Enclosed is additional biorhythm information that may prove helpful.

Straining for Decibels

The article, "Straining for the High Notes," in the September issue of THE MAC FLYER was reviewed with more than usual interest since the Medical Service is charged with conducting the Air Force Hearing Conservation Program. Your staff is commended for choosing to highlight this subject via this article; however, some of the conclusions to be drawn from the data presented are inaccurate and present a real possibility of undermining our ongoing hearing conservation program.

Sound levels are generally recorded on two seperate scales of measuring equipment. The overall sound pressure is measured on the "C-weighted" scale (dBC) and represents the noise level resulting from all sound frequencies generated by the noise source. The "A-weighted" scale (dBA) effectively attenuates the noise generated in the *very low* frequencies and, therefore, the measurements on this scale correspond more closely to the reaction of the human ear to noise. This scale is the one used to determine allowable exposure times above which personnel cannot be exposed without ear protection.

The article quotes sound pressure levels measured on the "C-scale" and then gives allowable exposure times which must be based, by definition, on "A-scale" readings. It is apparent that the author of the article knew the A-weighted readings which corresponded to the C-weighted readings quoted since the allowable exposure times quoted are stated correctly for the cockpit and cargo areas of the C-130E. However, his failure to mention the method of computing these allowable exposure times implies that one could be exposed to 110 dBA for two hours and 50 minutes and to 115 dBA for one hour. In fact, the allowable exposure to 110 dBA is only 5.6 minutes, and exposure to 115 dBA is not permitted without ear protection.

Since the same allowable exposure times at specific sound pressure levels are applicable to personnel in all aircraft and maintenance functions, request that the next issue of THE MAC FLYER contain a correction.

Darryl T. Markland, Maj, USAF, BSC
Chief, Bioenvironmental Engineering
Office of the Command Surgeon, MAC
Scott AFB, Ill.

★ Thanks for pointing out the inconsistencies in the decibel readings in the article and for explaining the methods used to record sound levels. But, as you said, the exposure times listed in the article for the various C-130 areas are correct, and that's what really counts for aircrew members.

Hercules or Galaxy?

Being a flight engineer in the 3d MAS, Dover AFB, I have occasion to read your fine magazine each month. I wish to draw your attention to a photo which appeared in your September issue, page 15, "The Voice at Six O'Clock." I checked around the squadron and with my chief engineer, and we all agree that it is definitely not a C-130 panel. As a matter of fact, our chief engineer even recognized the engineer pictured. His shoulder patch even looks like ours and we only fly the C-5A Galaxy.

Hope the above information is helpful to you in some way. Keep up the outstanding job you're all doing out there. By the way, when are we going to see a C-5A issue on our newstand?

Carmelo Roman, SSgt, USAF
3 MAS
Dover AFB, Del.

★ Your observation is correct. The photo was taken inside a C-5. Since no specific aircraft was mentioned in the story, you obviously noted that the author was an HC-130 flight engineer. Since the story was general in nature and could apply to any type of multi-engine aircraft, the editors did not feel it necessary to use a photograph of a C-130 cockpit. There are no plans for a C-5 issue; however, an "Operations" issue is planned for April which could include C-5 articles. Thanks for your comments. Keep up the fine work at Dover.

Short on ceiling and viz, the dynamic duo receive an icy reception from a not-too-happy two star.

Boss, this has got to be the worst flying weather I've ever seen. Everything's down within 400 miles of Scotch and we're intermittently below takeoff minimums." Long Suffering Sam was becoming increasingly apprehensive as takeoff time approached.

"M'boy," intoned C. R., "where's your can-do spirit? Like all weather guessers, you always pitch platitudes of doom and despair. Why, when I was TDY in Europe during the winter of sixty-two, this kind of weather was considered Vee F 'n' R. All we have today, Sammy, is a mere dribble of fog, a few freezing sprinkles, and a touch of cold in the air that'll insure peak mass rate of flow through our Pratt and Whitneys. But, alas, you wouldn't understand such basic principles of thermodynamics."

"Sir, what about the PIREP from that 727 pilot? He reported clear icing all the way down from 25,000 feet into Saint Looey," reminded Sam.

"Those airline weenies probably hyperventilated and got a little perspiration on their bifocals," decried the Master Manipulator. "Besides, I learned a trick or two during my flying days up in Alaska. As soon as the gear is in the well, I'll flatten 'er out and punch 'er up to 350 knots, then apply some elementary zoom physics, m'boy," declared the World's Greatest Aviator.

The two heralded a crew bus and in a few minutes were settling down in the cockpit of their T-39.

"Okay, Sammy, ring the clearance delivery folks and fetch us a vacant highway in the sky. Start flippin' the yellow pages so we can get some fuel, air, and ignition to these ancient stove pipes," blurted the Portly Pilot.

"Sir, what about the open writeup on number one engine anti-ice? I still think we oughtta have maintenance take a look at it; we're gonna need it if we get off," asserted C. R.'s concerned copilot.

"Ahem, well, er, ah, yes, m'boy. That writeup momentarily slipped my mind. Such thoroughness will be valuable when you upgrade to the left seat. But the anti-ice problem is only an intermittent indicator glitch. Besides, Sammy, my carefully worked out, high speed zoom climb profile will generate such high skin friction coefficients that engine anti-ice won't be necessary."

The Sabreliner taxied from the ramp to the parallel and was quickly consumed by an ever-thickening blanket of fog and drizzle. As C. R. braked the aircraft to a stop short of the runway, tower called.

"Chaff 99, be advised that the field is closed. RVR is one zero. State your intentions, over."

"Balderdash! Sammy, tell 'em we're ready for takeoff and we can see eight runway lights. Give tower a PIREP — RVR one six," blustered the Aviator with Avoirdupois.

"Boss, I can barely see four lights and the RVR is more like zero eight," cautioned Sammy.

"M'boy, all that namby-pamby RVR is for novices," rationalized the Rotund One. "If you squint real close, you'll see we have eight lights — four on the left side of the runway and four on right."

"Scotch Tower, Chaff 99 counts eight lights. Ready for takeoff," radioed Sam, reluctantly.

"Chaff 99, hold short. The SOF is on the way out to verify RVR," advised the tower controller.

"Sammy, le'mme enlighten that three level up in the fog," barked C. R.

"M'good man way up in the tower, as the minutes are ticking away, precious fuel is awastin', thus jeopardizing this high priority mission. General Fang might come forth with a tidbit of guidance if he catches wind of a tower delay on one of his missions," hinted the Intrepid Intimidator of the Uninitiated.

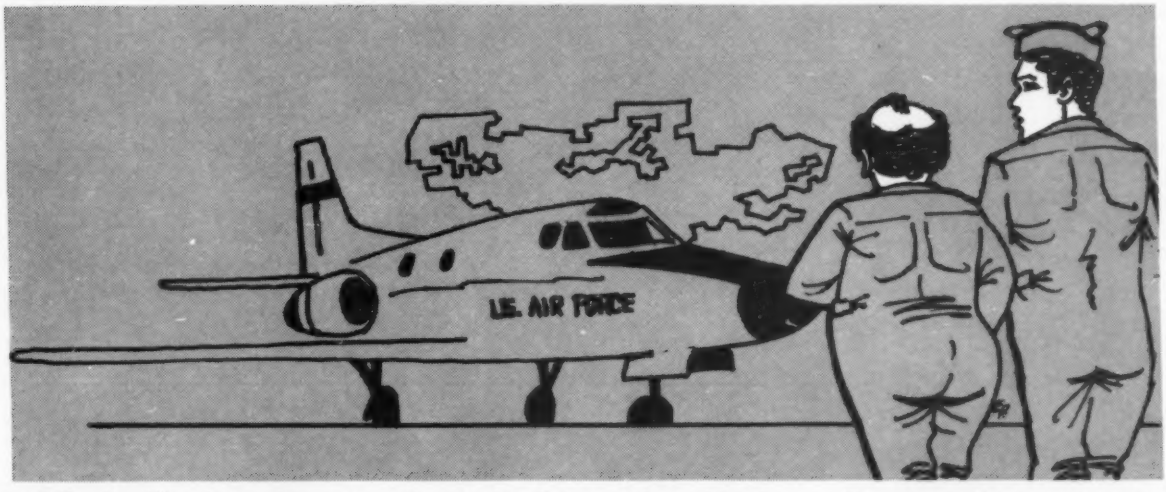
"R-r-roger, sir. Contact departure control; cleared for takeoff."

"Hey, Boss, that's sticking your neck on the chopping block," warned Sammy. "If you so much as blow a tire, that's the ball game."

"Tut, tut, Sammy, m'boy. I merely restructured the young lad's sense of priority. Now if you'll feed me the takeoff power setting, 'tis time to slip the surly bonds," goaded the Gross Griper of Throttles.

Holding the brakes for engine runup, the Paunchus Pilot jam-

C.R. TERROR



med the throttles forward to max power. With a neck-snapping jerk, the teenee-weenee airliner darted forward. It was scarcely more than 800 feet down the runway when fog completely consumed it.

"After takeoff check, m'boy," called C. R. as the gear settled into the belly of the aircraft. "Ya see, Sammy, nothin' to it. Contrary to popular belief in the ops center, fog and freezing drip don't take all the lift out of the air. But just to be safe, Sammy, ring Saint Looey departure and get an unrestricted climb clearance to flight level three-one-and-oh," directed the Dauntless Driver.

". . . unable flight level 310 due to conflicting traffic. Maintain five thousand until further advised," replied the departure controller.

"Conflicting traffic?! What's the matter with that scope dope? Hasn't he ever heard of vectors around traffic?!" exploded the Baid One.

Adding to their woes, the master caution light suddenly illuminated. Squinting at the annunciator panel across the cockpit, C. R. was unable to make out the fuzzy amber warning indication.

"C'mon, Sammy, what's the problem? You know I can't interrupt my speedy instrument cross-check to peruse such trivia," challenged C. R.

"Boss, engine anti-ice on number one has failed — the same one that was written up in the forms," moaned Sammy. "EGT is going out of sight and fuel flow and r.p.m. are fluctuating. Looks like we got ice buildup and the beginnings of a compressor stall on number one, Sir."

"Calm down, Sammy, m'boy. Got everything well under control. What the engine needs is a good cleaning out. About five minutes at max power oughtta do the trick," explained the Master Manipulator.

"But, Boss, that'll probably tear hell out of the engine," implored Sammy.

"Nonsense, Sammy, these Pratt and Whitney mini-stove pipes can digest just about anything short of the kitchen sink — a few bits of ice will scarcely cause a hiccup," persisted C. R.

As both throttles were advanced to max rated thrust, EGT began dropping and r.p.m. and fuel fluctuations ceased momentarily.

"There, Sammy, all is well in the propulsion systems. Now le's-see about that climb to angels three one."

Kaababoooom! With its inlet guide vanes and nacelle iced up and compressor blades taxed beyond their capacity, number one compressor stalled and the engine belched a jet of flame.

"Yeeeooww! Mayday! Pull the T-handle and prepare for crash landing!" cried C. R. as he grabbed both throttles.

"Boss, your pullin' off the wrong throttle! Number two's okay — we gotta shut down number one!" corrected Sammy,

C.R. Terror

pointing to the pegged-out EGT gauge.

"Very good, Sammy. Your response to this crisis requires no further refinement," conceded C. R. nervously.

"Sir, I hate to be the bearer of ill tidings but we're still icing up. With only one engine on the line, we better start thinking about getting this dude on the ground," informed Sammy.

"Why, right you are, m'boy. But I'm way ahead of you. If you'd been paying attention, you would have seen me take up a course to Dickie Goober air patch," revealed C. R.

"Sir, Goober is WOXOF."

"What's that mean in real language?" shouted C. R.

"Total obscuration, sky totally obscured, zero visibility in fog, Sir," replied Sammy.

"No matter, m'boy. We'll follow plan B and head on over to Saint Looey," replied the Pompus Pilot.

"Boss, Saint Looey is down to an eighth of a mile in freezing rain and ATIS just advised that all runways are closed. With ice steadily accumulating on our machine and our airspeed slowly bleeding off, I think we better take our chances back at Scotch. They're at least a hundred and a quarter," Sam advised.

"Sammy, m'boy, your suggestion just happens to coincide with my own well-thought-out course of action and this will give me an opportunity to execute a real low viz single engine precision approach," boasted the Intrepid Interpreter of Instruments.

On radar vectors back to Scotch, the ice-laden Sabreliner staggered and strained on one engine. Scotch Approach positioned the stricken bird for a short radar monitored ILS approach. C. R. intercepted the glide path.

"Got it wired, Sammy. Just look at the flight director; right on the money, m'boy. Another 30 seconds and we'll be heroes," sighed the Idol of Airlanes.

"Sir, airspeed is dropping — ten knots low and we're drifting left," responded C. R.'s long suffering copilot.

". . . at decision height. Chaff 99, too far left for safe approach. Go around; acknowledge," directed the radar controller.

"Never mind him, Sammy. I got the runway at twelve o'clock. Recheck gear and flaps," chuckled C. R.

"Sir, that's the taxiway," shouted Sam. But it was too late. The Sabreliner slammed onto the taxiway and began to skid toward fog-obscured crash vehicles.

"Look out, Boss — a fire truck!" barked Sammy.

"Yeeeoooww!"

C. R. mashed the brakes and applied full nose wheel steering to no avail. The mini airliner darted off the taxiway, careened across the muddy infield and up onto the ramp toward a blue staff car. The plane was skidding to a stop as it crunched into the front end of the staff car. A small two-star flag fell onto the ramp.

"Boss, you've really done it now. General Fang is getting out of his car and he doesn't look too happy."

Bolting out of his smashed car, General Fang rushed forward to the crew entrance door just in time to meet C. R.

"Major Terror! I might have known it was you. I've been monitoring this so-called high priority mission for the past half hour. I expect you to have some snappy answers in my office in exactly one hour, Major," barked the red-faced two-star, thrusting himself into another vehicle.

"Y-y-yessir," humbly replied the Round One.

As the general sped off, Sammy climbed out of the slightly crunched aircraft.

"Hey, Boss, what did the two-banger say?"

"Ahem, well, m'boy, he wasn't too pleased about his staff car getting crumpled but he wants more details on my superb emergency recovery, considering my limited options and all. I better get going. Got less than an hour to get over to headquarters."

"Sir, it's only three blocks away."

"Yeah, I know, Sammy, but I think I'll walk. I've had enough of airplanes and automobiles for one day."

1976 IS HERE!

And so is the 1976 MAC Flying Safety Writing Contest . . .

Did you make your New Years resolutions yet? If so, did you include THE MAC FLYER? The mag needs your help in making the MAC Flying Safety Writing Contest a success. We know you have stories to tell, 'cause we've heard some. And you don't have to be a professional author. All you need do is push yourself a little. You may be surprised at the result.

Remember, you don't have to be a high-time AC or flight engineer. If you have any inclination at all toward expressing yourself, you could come up with a really good yarn like:

- The navigator who saved the day by guiding the aircraft around a mountain at night and IFR.
- The engineer who identified a missing aileron boost pack on preflight.
- The loadmaster who discovered 2,000 pounds of extra gear in a communications van to be loaded on his bird.
- The copilot who ate his flight lunch shortly after takeoff and became ill, thereby warning the aircraft commander and other crew members of possible food contamination.

Whatever your story, make plans to enter the contest. Here's how:

Send two typewritten, double-spaced copies of your work (it can be poetry, fiction, nonfiction, philosophy, technical, etc.), identified by title only. Next, attach a cover sheet with your story title, your name and address (military, if you have one), and a short biographical sketch.

Anyone can enter — anyone! You must be assigned to MAC (reserve or active) and be either military or DAF civilian in order to qualify for the official prizes; but MAC or not, if you win, your article will be published.

Resolve to keep your entry between 1,000 and 3,000 words (that's about six to 14 typewritten, double-spaced pages) and be sure it's an unpublished, original, flying-oriented creation. And post it by 31 March 1976!

When you've put the finishing touches on your entry, send it to:

The MAC Flying Safety Writing Contest
MAC/IGFE
Scott AFB IL 62225

Then, sit back and wait for the names of the winners to be announced.

Quick Stoppers

Thermal Shock

After broiling for over an hour under the hot Arizona sun, a T-39 darted skyward to flight level 330. Throughout the first half hour of flight, the windshield overheat light illuminated whenever the pilot turned on the windshield heat. Shortly after level-off, the pilot flicked the windshield heat switch again and finally it appeared to operate normally.

Later, at flight level 370, both pilots heard a loud noise and saw a crack spread across the left forward windscreen. Facing a potential explosive decompression, the crew donned their oxygen masks, declared an emergency, and made a rapid descent to a civilian airport.

Investigators suspect that thermal shock, precipitated by sudden temperature extremes (from 43°C on the ramp to minus 30°C at altitude within 30 to 35 minutes) proved too much for the windscreen. AFLC is working to solve such problems in the T-39 windshield heat system.

A Jump Seat for the T-39?

A proposal has been made at MAC headquarters to install a cockpit jump seat on the command's T-39 Sabreliners. The jump seat would be used by an additional crew member on training missions, functional check flights, flight evaluations, or while acting as outside safety observer.

Since 1968, three crew members have been injured in flight while standing between the pilot and copilot seats. In each case, the observer fell to the floor during steep banks. Two broken ankles and one compression back fracture resulted. Swing-type jump seats are installed in the Navy CT-39E (Sabre 40) and the CT-39G (Saber 60) aircraft, but not in Air Force T-39's.

Pinned for Trouble

While accomplishing flight control checks on the before-takeoff checklist, the pilot was unable to move the yoke forward of neutral. Subsequent inspection of the elevator control system uncovered a rigging pin partially lodged in the elevator pack cylinder.

Investigators believe the pin was left installed after earlier maintenance on the elevator. Apparently, Lady Luck had been an invisible passenger on several earlier sorties that were flown without incident. 'Nuf said.

Pocket Calculator vs ADF

Tests by Canada's Department of Communications confirm that electronic pocket calculators can interfere with ADF radio compasses. Of five calculators tested, two paralyzed the radio compasses when held within three feet of the loop antenna. The other three caused varying degrees of radio compass bearing pointer deflection. When a calculator is turned on, the greatest deflection of the ADF occurs at maximum range from the station, when signals are weakest. Calculators produce interference in the 200 to 450 KHz band. Tests on calculators are continuing but, meanwhile, if you must carry these miniature transmitters, make sure they're switched off. They don't have to be calculating to lead you astray.

— FLIGHT SAFETY FCCUS

Big Wind on the Ramp

After climbing atop the HH-53 for postflight inspection, maintenance personnel began to rotate the rotor system to check the blades. Meanwhile, a C-141 parked directly in front of the helicopter began to taxi. The C-141 pilot pushed the throttles forward and executed a sharp right turn out of the parking spot. The resultant jet wash over the chopper generated enough airflow to pinwheel the rotor system. Several of the gyrating blades struck the open APP cowling and damaged the cowling and the blades.

High power settings on the ramp are okay — but only if the area behind the engines is clear. Otherwise, aircraft movement in congested areas requires a light touch on the throttles and a check in the rear before moving out with gusto.

Stretching 60-16 Thin

The Hercules was climbing to FL 180 when the crew discovered it wouldn't pressurize with either "normal" or "manual" function selected. The AC elected to continue the climb while his staff experts troubleshot the problem.

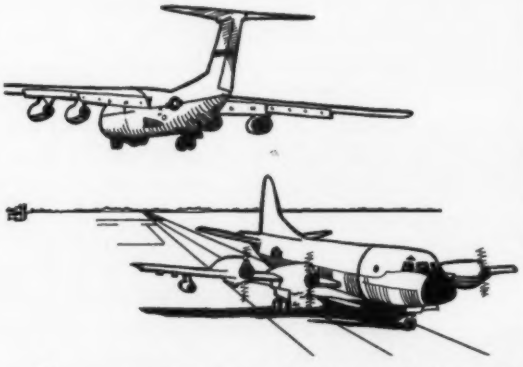
Using walk-around oxygen bottles, the crew chief, flight engineer, and the loadmaster inspected the main cabin and found the center overhead escape hatch partially open. Attempts to close the hatch failed, so the three removed it for in-flight repair. Breathing directly from an oxygen regulator hose while repairing the faulty hatch, the crew chief began to hyperventilate and became nauseous. The pilot declared an emergency, descended, and landed without further incident.

Although there were enough oxygen regulators aboard the aircraft for everyone, there was a shortage of oxygen masks and the crew chief ended up sucking on a hose. This hardly complies with the intent of paragraph 6-5 of AFR 60-16: "If loss of pressurization occurs and any occupants are not provided functional oxygen equipment, a descent to 10,000 feet MSL will be made."

QS

Sigonella Syndrome

A Navy P-3 crew guided their bird clear of the runway and onto the parallel taxiway at Sigonella NAF, Sicily. Looking down the far end of the taxiway, the Navy pilots were amazed to see a C-141 on short final — to the taxiway! The Navy pilots prepared to taxi their turboprop off the taxiway into the infield while transmitting a frantic warning to the C-141 crew that they were lined up on the taxiway. Observing the scene, an alert tower controller ordered the Starlifter crew to "go around." Everyone breathed easier as the C-141 complied with the go-around order.



The C-141 crew had fallen victim to erroneous visual cues and the lack of straight-in instrument guidance at the field. Approaching the airport at about sunset, the crew had sighted and lined up on the highly visible white concrete taxiway instead of the less visible asphalt runway.

Beware of the Sigonella Syndrome and similar symptoms at many fields around the world. The runway may not be all that it seems.

T-39 Landing Gear Door Position Switch

Approximately ten minutes after the T-39 took off, the inboard landing gear doors began to cycle as evidenced by a red light in the gear handle and audible thumps from beneath the aircraft. After analyzing the unusual gear symptoms, the aircraft commander decided to open the landing gear control circuit breaker. That stopped the door from cycling, though the red light in the gear handle remained illuminated. But after awhile the red light mysteriously went out. Believing that the door problem had solved itself, the AC closed the circuit breaker and configured the aircraft for landing. Touching down short of a BAK-9 barrier, the pilot terminated the flight with no further problems — that is until postflight inspectors discovered damaged inner gear doors. An open gear door position switch had caused the inner doors to remain open after the gear was extended and the doors struck the BAK-9 cable during landing roll.

Although the item is not on the checklist, T-39 pilots should insure the gear door position switch is in the "normal" position prior to takeoff. It's cleverly hidden in the aft section of the left main gear well almost directly behind the tire. MAC standardization has submitted a change to the T-39 preflight checklist that would require inspecting this switch.

after deadline . . .

NEW MARKINGS FOR UNSTRESSED TAXIWAYS -- Now your friendly civil engineer has come up with a more economical way to mark unstressed portions of the ramp. As those old perpendicular warning lines fade out, CE will be painting a different pattern to help pilots avoid that "sinking feeling." AFM 88-14 now calls for two parallel yellow lines, six inches wide and six inches apart, to "cordon off" unstressed taxiways. In areas where this might be confusing, the old perpendicular lines will appear.

HAPHAZARD REPORTS -- Late hazard reports often prevent the guys in Safety from doing their job as efficiently as they would like. This is particularly true regarding ATC hazards. It's important that you notify the agency of the hazard and your intent to file a report. ATC will impound the tapes for use during the investigation. And don't forget -- your HR should be accomplished as soon as possible after your next landing.

NEXT MONTH --

* Jeremy Prune is an RAF helicopter pilot who will be featured in the centerfold. Don't miss it!

* A special feature on an African airfield survey.

* Montezuma's Revenge was nothing compared to a recent episode involving food poisoning aboard a jumbo jet. Read about it in "Gastronautics -- Chowing Down in Flight."

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Touch 'n Go